UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF RIVER TRASH COLLECTOR

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours.

by

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I hereby, declared this report entitled Development of River Trash Collector is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Industrial Electronics) with Honours. The member of the supervisory is as follow:

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ABSTRAK

Sungai adalah antara sumber air tawar paling penting di bumi kita dan ini adalah salah satu sebab penting mengapa kita perlu menangani isu pencemaran sungai yang sangat berleluasa. Sungai tercemar mempunyai kesan yang sangat berbahaya kepada ekosistem sungai dan mungkin menurunkan paras oksigen. Kos yang lebih tinggi dan lebih banyak tenaga manusia untuk membersihkan sungai adalah masalah utama. Pemungut Sampah Sungai dibangunkan untuk mengutip semua sampah di sungai dan menganalisis kadar aliran, jumlah air dan kekerapan. Meter aliran digunakan untuk mengukur kadar aliran dan isipadu manakala pam air digunakan untuk menghisap semua serpihan. Pemilihan kabel, penyambung, saiz paip yang betul adalah penting untuk projek ini. IDE Arduino digunakan untuk membuat system pengekodan dan kemudian memantau pengukuran kadar aliran, kelantangan dan kekerapan. Secara keseluruhannya, saiz paip dan sampah mempengaruhi kadar aliran dan isipadu bagi menyedut sampah.

ABSTRACT

Rivers are among the most crucial sources of freshwater on our earth and this is one of the important reasons why we have to address river pollution issue very important. Polluted rivers have the really dangerous impact on river ecosystems and may drop the oxygen level. The higher cost and more manpower to clean the river is the main problem. River Trash Collector is developed in order to collect all debris on river and analyses the flow rate, volume of water and frequency. Flow meter is used to measure the flow rate and volume while water pump is used to suck all debris. Choosing the correct cable, connector, size of pipe is important for this project. Arduino IDE is used to make the coding system and then monitor the measurement of flow rate, volume and frequency. Overall, the size of pipe and bin influenced the flow rate and volume in order to suck the trash.

DEDICATION

I dedicate this thesis to my beloved parents, supervisor, and my fellow friends. May Allah bless them.

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First and foremost, all praise to Allah for His mercy that this thesis can be completed on time. I am thankful to my supervisor, Mr. Wan Norhisyam b. Abd Rashid for his advice and guidance from beginning until I can complete my project. To my beloved parents, I offer them my deepest gratitude for all their prayers and support. Lastly, I offer my regards and blessings to my housemate and classmate who always supported me in any aspects during the completion of this project.

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LIST OF SYMBOLS

D, d	-	Diameter
F	-	Force
g	-	Gravity = 9.81 m/s
I	-	Moment of inertia
1	-	Length
m	-	Mass
N	-	Rotational velocity
P	-	Pressure
Q	-	Volumetric flow-rate
r	-	Radius
T	-	Torque
Re	-	Reynold number
V	-	Velocity
w	-	Angular velocity
x	-	Displacement
z	-	Height
q	-	Angle

LIST OF ABBREVIATIONS

PCA	Principal Component Analysis
GPS	Global Positioning System

CHAPTER 1

INTRODUCTION

1.1 Background

River pollution is a water pollution which means the introduction into rivers of various chemicals and other pollutants, such as sewage, food waste and agricultural effluent. Rivers are among the most crucial sources of freshwater on our earth and this is one of the important reasons why we have to address river pollution issue very important. Polluted rivers have the really dangerous impact on river ecosystems mostly because water pollution causes the important drop in oxygen levels, and many animals are not able to tolerate low levels of oxygen in rivers. Malaysia is one of the countries in the world have an attractive river. At this point, some people like to throw the waste into the river and the condition of the river is contaminated by the behavior of some people, but at that point the condition is polluted by people like to cast the waste into the river. This action will create it flood occurred and suffer many people nearest of river. Besides that, the water pollution will happen. Ministry of Agriculture was launched many programs to give exposure to people about the collapse of habit like to throw the waste into the river. Besides that, the government also spent budget in building the trash trap but this solution does not give the big impact to ensure the river clean from the waste. Another program from the government is to ensure the river environment clean from the waste is hired the contractor to collect the waste. One of the solutions is invented the waste trap to collect the trash to follow the plan or time set. From this issue, River Trash Collector with Pump

will be designed. Besides that, the cost is reduced to design it. Where used the water pump as the crucial element to suck the waste and trap into container tank.

1.2 Problem Statement

The waste domestic which is consists of garbage and sewage dumped randomly into the river is the main reason of water pollution. Insufficient oxygen and low quality of the water can be a threatened marine life. It became a source of disease and animals that drink this water can event pass this disease to people after they eat an infected animal (Nasir, 2016). Other that, high cost to clean the river is another problem. The government provide more budget in build trash trap. Hence, it required more manpower to collect the waste. The suitable trash collector is required in order to overcome this issue.

1.3 Objective

The objectives of this project are:

1. To develop the river trash collector.
2. To collect the debris in pond.
3. To analyse the flow rate, volume of water and frequency

1.4 Scope

The scope of this project is:

1. The system of trash collector is monitoring by using Arduino.
2. Propose the best design and improvement be made for river trash collector.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter describe the information about water pollution in Malaysia and also Melaka River. Other that, this chapter is discussing about information the previous project is discuss which is Seabin and Waterwheel Garbage Collector with the operation.

2.2 Structural Pattern of Water Pollution and it Sources in Malaysia

In Peninsular Malaysia, development of industry has done successfully contributions to the development of economy. The employment is improved and then socio-economic and infrastructure development is promoted. However, it has serious environmental consequences because all companies need to use renewable and non-renewable resources. The conversion of these materials into finished or semi-finished industrial products undoubtedly leads to contaminants frequently discharged into water as waste. These wastes are in solid, liquid or gaseous forms and when discharged indiscriminately could adversely affect the quality of the water (Muyibi, Ambali, & Eissa, 2008).

The Department of Environment (DOE) has listed 2.292 industries as important sources of water pollution in Peninsular Malaysia. 928 (40%) food and beverage (F&B) plants, 324 (14,1%) rubber processing and 270 (11,4%) critical chemical products were the main pollutants industries. Based on the water pollution sources by state in Peninsular

Malaysia, mostly was found in Selangor (414), Johor (384), Penang (328) and Perak (253).

Besides natural water pollution, the major contributors to water pollution are animal waste and wastewater accompanied by agricultural and manufacturing industries in the country. In terms of the burden of pollution, both the manufactures and farming (palm-oil and rubber) industries contributed 8 percent (37 t / day) in 1988 to the demand for Biochemical Oxygen, different from 13% (65 t / day) and 79% (385 t / day).

Table 2.1: Distribution of major point sources of water pollution, Malaysia, 1991

State	Palm oil	Raw rubber	Rubber product	Food bevera	Textile/leather	Paper	Chem.	Total
Selangor	29	13	132	94	22	15	109	414
Johor	67	41	36	136	59	11	34	384
Pulau Penang.	5	9	35	164	58	14	43	328
Perak	36	26	28	133	13	5	12	253
Kedah	3	29	22	98	9	2	8	171
Terenganu	11	3	6	84	16	–	–	120
Pahang	58	20	3	33	–	1	1	112
Wilaya/P	–	4	26	21	10	13	31	105
Sabah	27	4	3	49	5	11	5	104
Negeri/S	12	22	13	15	2	22	9	95
Melaka	3	12	17	21	7	3	11	74
Kelantan	8	11	1	28	4	1	3	56
Sarawak	6	4	1	38	–	3	4	56
Perlis	–	–	1	14	1	–	–	16
Total	255	198	324	928	206	101	270	2,292
Percent.	11.6	8.6	14.1	40.5	9.0	4.4	11.8	–

Organic emission has risen from 485 to 1,033 loads as proof of BOD published in line with the sector between 1990 and 1993. The table shows that animal waste is a country problem Also unnatural in terms of land ownership concerns and of the low regard of society as a backyard instead of a modern industry of animal husbandry.

Table 2.2: Natural water pollution by sectors 1986–1988

Sector	1986			1987			1988		
	BOD (1) load	Percent (%)	Popu. (2) equi.	BOD (1) load	Percent (%)	Popu. (2) equi.	BOD (1) load	Percent (%)	Popu. (2) equi
Agro-based industries	11	2.4	0.22	15	3.0	0.3	12	2.0	0.24
Manufacturing industries	21	4.6	0.42	25	5.2	0.5	25	6.0	0.5
Animal husbandries	60	13.1	1.20	65	12.4	1.3	65	13.0	1.3
Population (sewage equi)	366	79.9	7.32	380	78.4	7.6	385	79.0	7.7
Total	458	100	9.16	485	100	9.7	487	100	9.74

(1) means in tonne/day and (2) means in million, using a BOD load of 0.05 g/capacity/day

The elimination of waste material from city areas proceeds in terms of effective management and recycling of water resources. The amount of waste is nitrate and phosphate-based water. Biologically speaking, this is often a major cause of downstream eutrophication and a major correction of the marine habitats characteristics of certain river systems.

Table 2.3: Natural pollution load discharged according to sector 1990–1993

Year	1990		1991		1992		1993	
Sector	BOD load	Population equivalent	BOD load	Population equivalent	BOD load	Population equivalent	BOD load	Population equivalent
Agro-based industry	15	0.3	12	0.24	30	0.60	28	0.56
Manufacturing industries	25	0.50	25	0.50	27	0.54	77	1.54
Animal husbandry	65	1.30	65	1.30	211	4.20	230	4.60
Population (sewage)	380	7.60	385	7.70	481	9.63	698	13.96
Total	485	9.7	487	9.74	749	14.97	1,033	20.66

2.3 The Clean Oceans Device

The plan is to use a centrifuge-like system to separate the contents on the basis of density. This device would pump water with a bilge pump into our system. The circular curvature inside the water flow leads the thicker things outside while a shorter path follows the less dense objects. The water that carries the plastic waste flows into a storage room at the end of every path. This waste-free "filtered" water will then be pumped out to our power (Lardizabal, Wu, Lam, Lam, & Lau, 2011).

The robot is developed that would remain in the ocean for a longer period of time and be able to work completely. It has a GPS unit with a software that tells the system to track a specific path and carry more sensors that detect location, power level, tank capacity and other necessary sensors. Hence, the prototype is made that can be adjust to improve our design for later generations.

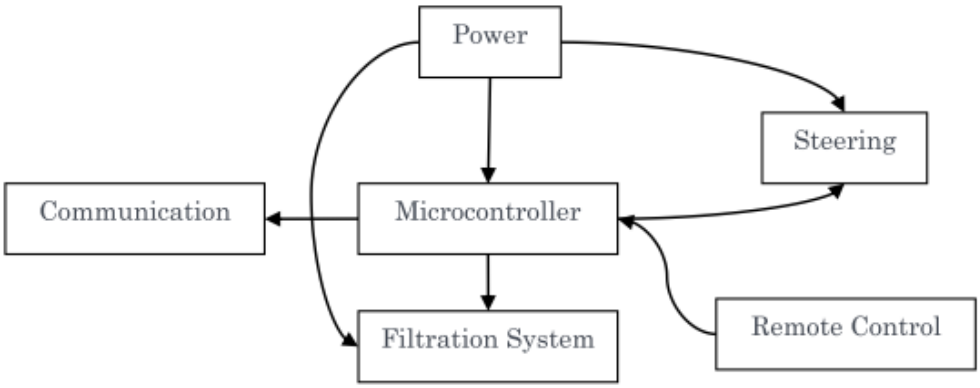

Figure 2.1: Block diagram for proposed project

2.3.1 Prototype I

The team has assembled the first initial prototype that relies solely on the presence of an activity of a bilge pump. The use of ocean water with plastic waste pollution was based on the passive natural flow-in cut at the front of the system while the model was designed. The model of this proof of use is a conventional five-gallon tub, which has a bilge pump with a capacity to carry out the debris and has a capacity of 800 gallons an hour. The prototype can collect the debris but it could not be kept in its collection chamber. As the design approach is more passive, debris would only hang around the top of the device. The device would be filled up after a few more hours and run the risk of recycling some of the collected device into the water.